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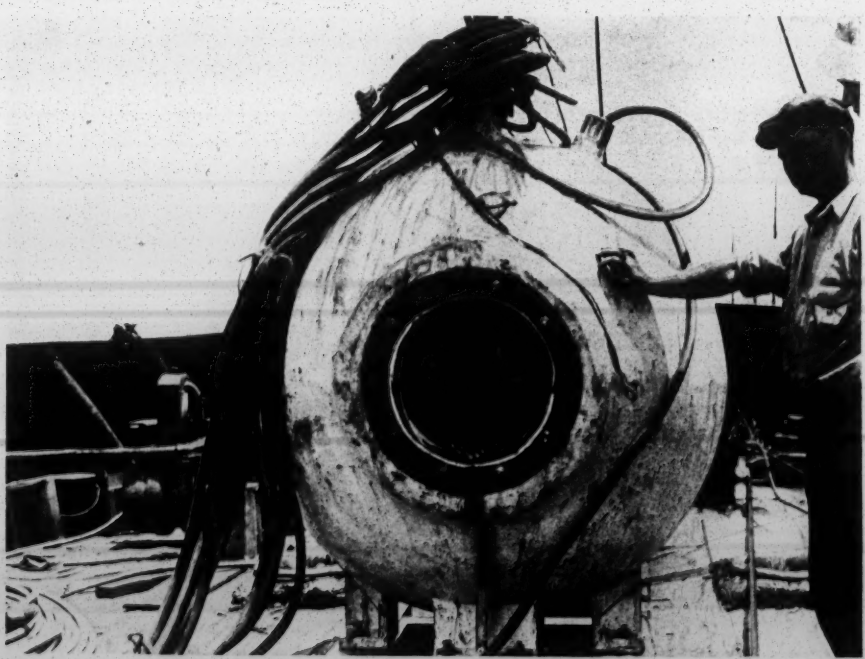

© *Photograph from William Beebe*

THE BATHYSPHERE, ARGOSY OF THE LOWER DEPTHS

In this unique iron ball man has descended his greatest distance into the vast unknown world under the sea, about 2,200 feet. Once sealed inside the two-ton sphere the divers' only method of communication with the outside world is by telephone (See Bulletin No. 3).

HOW TEACHERS MAY OBTAIN THE BULLETINS

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Puerto Rico, "The Switzerland of the West Indies"

PUERTO RICO, Uncle Sam's fertile and populous West Indian colony, came into world news twice in recent months. First, when it officially changed its name from Porto Rico to the Spanish spelling "Puerto Rico," and later, when a hurricane ripped its way across the island, killing more than 200 and injuring 2,000 of its citizens. San Juan, the capital, and other cities suffered millions of dollars' worth of property damage.

Americans visiting Puerto Rico for the first time usually are amazed to find that it is so mountainous. While none of its rugged peaks reaches the snow line, the scenery is wild and beautiful, and the tumbling, tossing crags have challenged road builders and plantation owners for four centuries. In fact, Puerto Rico is often called "The Switzerland of the West Indies."

Railroad Line Follows the Coast

The railroad has not yet conquered the mountain fastnesses of the interior. Puerto Rico's principal railway line has been content to follow the easy course of the narrow, coastal plain between the peaks and the sea. Consequently, journeys by rail in Puerto Rico are twice to five times as long as those over the mountain roads.

One of the secrets of Puerto Rico's commercial growth has been the development of a system of highways unsurpassed anywhere in the world—highways that bring every section of the island into close touch with its nearest port, and at the same time make it a motorist's delight.

When the American occupation began in 1898 the military road across the center of the island from San Juan, the capital, to Ponce, on the south coast, was the only road worthy of the name. To-day visitors have a choice of at least two direct roads between these points, and of many others through equally beautiful sections of the Cordillera Central, which in places reaches 4,000 feet above the sea.

Old and New on the Highways

Transportation methods in Puerto Rico differ from those in the States. The automobile and the motor truck carry most of the passengers and freight, although the coast railroad gets bulk materials. But vying with them on many of the roads of the interior are the creaking oxcarts and the high-wheeled victorias of the older plantations.

Here also are barefoot *jibaros*—the rural, laboring native whose name means literally "escape from civilization." Good-natured, reconciled to a hard lot and precarious existence, a mixture of Indian and Spaniard, the *jibaro* combines the care-free ideals of the Redskin and the impetuous temperament of the Spaniard.

While Puerto Rico is not an industrial country, the landscape in many parts of the island is dotted with tall chimneys, from which rolling clouds of black smoke pour. These are sugar "centrals," where the juice is pressed from the cane by heavy machinery. The black smoke comes from the pulp, used for fuel.

Puerto Rico's main crops have more or less separate zones. Sugar cane is grown chiefly in the lowlands near the coasts, tobacco in the foothills, and coffee in the higher lands of the interior (see illustration). From the main roads the visitor often sees, at a distance, snowy patches in the valley that look like glaciers or snow fields. Upon coming closer, however, he finds they are vast fields of tobacco

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© Photograph by Capt. A. W. Stevens

SAN JUAN, PUERTO RICO'S CAPITAL, RISES FROM A LONG, NARROW PENINSULA

Morro Castle, in the foreground, dates from 1538. This hoary fortress was assaulted in 1595 by Sir Francis Drake and his English fleet, when gold-laden galleons bound from Mexico for Spain took refuge in the harbor. The English were beaten off. Its green parade ground and outer moat to-day form part of a public golf course, and the frowning guns which once belched flame and death are but tourist "sights." Hundreds sought refuge in the old fort during the hurricane (See Bulletin No. 1).

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Wheat for Coffee and Nitrate, Potatoes for Education, Recall Barter Days

AMERICAN wheat for Brazilian coffee, more American wheat for Chilean nitrate, college students paying tuition with potatoes, rural editors accepting firewood for subscriptions—these and many other similar transactions in recent months recall the days of barter.

The modern word "pecuniary," from pecus, cattle, has its place in our language because cattle were once money. Sheep represented a lower monetary denomination. They were small change! Ten sheep equaled one ox.

Copper Pots to Gold Coins

After copper was mined in Cyprus and pots made of it, these utensils were used for money. Later strips of copper replaced pots as a medium of exchange, and later still these were of a definite weight. When shrewd traders debased copper by mixing cheaper metals with it, or gave pieces of short weight, it became necessary for the local government to step in, test the metal, and certify to its value by a stamp. Thus the modern idea of metal money of value was born.

When copper became plentiful and therefore cheap, it was too bulky to serve as the principal money. Silver displaced it and ruled the money world for 2,000 years. In time the same thing happened to silver that had happened to copper. It became too bulky to figure in large transactions. Gold, which had always been in the background as money, was brought forward to become a standard money metal.

It was discovered almost by accident that a strong government could take a piece of metal of relatively low value, stamp a higher value on it, and have it accepted in trade as though it were truly worth the stamped amount. Thus token coinage, or under-value money, came into existence, marking another important step in money's evolution. It was partly real value and partly value based on trust in the issuing agency. In the United States all of our small silver, nickel and copper coins are tokens. None of them will melt down into metal of as great value as the price stamped on them.

Paper money may be looked upon as token money carried to its final extreme. A piece of it has no value at all in itself; the value depends wholly on a promise printed on it. But although the idea of paper money might be expected to follow easily from token money, no one in the West seems to have thought of it until more than a thousand years after token coins appeared.

First "Paper" Money a Brick

Oddly enough, the first "paper" money was a brick; for the germ of the idea seems to have been born in Babylonia more than two thousand years before the Christian era. Bonds for the repayment of loans were written on clay tablets and baked. These passed from hand to hand. Similarly, deposits were made with individuals, and clay-brick drafts were written against them. Later brick bills of exchange transferred wealth from place to place.

In Europe paper to represent money first came into use, apparently, during the Middle Ages when the Jewish financiers of those days reinvented the bills of exchange of Babylonia and recorded them in ink on parchment and paper. Individuals also accepted coin and bullion for safe keeping and issued receipts payable

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covered with white cheesecloth, which protects the young plants from the scorching sun and from insects. Hundreds of yards of this cotton fabric are spread over the Puerto Rican landscape.

With its central mountain mass and a heavy rainfall, Puerto Rico has a wealth of streams, numerous waterfalls and much waterpower awaiting development. Near Comerio, on the Spanish road, is a huge concrete dam, and a hydroelectric plant that is the forerunner of several planned for the island. The average annual rainfall on the island is 71 inches, but in several mountainous districts it amounts to nearly ten feet.

Note: For additional references see "Porto Rico, the Gate of Riches," *National Geographic Magazine*, December, 1924; "Skypaths through Latin America," January, 1931; and "To Bogotá and Back by Air," May, 1928.

Bulletin No. 1, October 17, 1932.

© *Photograph by Frederick E. Cook*

THE COFFEE HARVEST IS A FAMILY AFFAIR IN PUERTO RICO

Most of the island's coffee plantations are in the interior, on the foothills and lower slopes of the central mountains. While the first red berries are gathered as early as July the harvest season does not close until February. Coffee, sugar and tobacco provide work for many of Puerto Rico's million and a half inhabitants.

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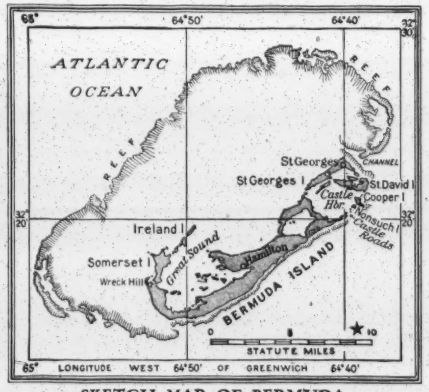

SKETCH MAP OF BERMUDA

Star indicates scene of man's deepest dive

New "Low" Reached in Deep-Sea Diving off Bermuda

MAN is expanding his sphere of vertical activity.

This summer, Professor Auguste Piccard, Belgian scientist, established a new exploring "high" when he reached an altitude of ten miles above the earth in a balloon over Europe. Last month William Beebe, noted American scientist, made a new "low" by descending in a bathysphere 2,200 feet, almost a half mile, into the Atlantic Ocean off Bermuda.

How the Idea Came About

What is a "bathysphere" and how does it work? In a special communication to the National Geographic Society, Dr. Beebe describes the first dive made in this unique argosy of the depths, on June 6, 1930:

"Modern knowledge of deep-sea fish is comparable to the information of a student of African animals who has trapped a small collection of rats and mice but is still wholly unaware of antelope, elephants, lions and rhinos.

"The hundreds of nets I have drawn through the depths of the sea, from a half to two miles down, have yielded a harvest which served only to increase my desire actually to descend into this no-man's zone. Three years ago Mr. Otis Barton and I discussed the possibility of a steel sphere, large and strong enough to permit us to enter, be sealed up, keep ourselves alive, to descend into and return safely from the depths of the ocean.

Named for a Fish

"When the steel sphere finally took shape we fumbled for a name—calling it in turn tank, cylinder and bell. One day, when I was writing the name of a deep-sea fish—*Bathytroctes*—I was struck by the appropriateness of the Greek prefix meaning 'deep.' I coined the word Bathysphere, and the name has stuck.

"In April, 1930, I took my staff to my shore laboratory on Nonsuch Island, which had been given by the Bermuda Government for oceanographic work. Mr. Barton brought with him the great sphere weighing two tons, thirty-five hundred feet of non-twisting steel cable, and a half mile of solid rubber hose containing telephone and electric light wires.

"In my turn I was able to provide my great seven-ton Arcturus winch, the 'Gladisfen' for towing us out to sea. A huge, open-decked barge, the *Ready*, was chartered, furnished with a mast and derrick, and two boilers for working the winches.

"June sixth was a day of almost perfect calm with only a long, heaving swell in mid-ocean. We steered straight out, and an hour later the angle of the two lighthouses showed that we were about eight miles offshore, with more than a mile of water under us.

"We put in the oxygen tanks, one of them fitted with a delicate valve which permitted two litres of oxygen to escape every minute. There were two wire racks, one of calcium chloride for absorbing moisture, the other of soda lime for removing the excess of carbon dioxide from the air. Otis Barton climbed in after me, we disentangled our legs and got set.

Windows of Fused Quartz

"I had no idea that there was so much room in the inside of a sphere four and a half feet in diameter, although the longer we were in it the smaller it seemed to get. I turned my attention to the windows, cleaned them thoroughly, and tested the visual angles which I could attain by pressing my face close to the surface. The windows were made of fused quartz, three by eight inches, the strongest and most transparent substance in the world.

"Like the lightest of airplane take-offs, we rose from the deck and swung out over the side. Here we dangled for a short time and then slowly began to sink.

"A few seconds later word came down the hose that we were at fifty feet, then one hundred,

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on demand. Thus, the first modern gold and silver certificates passed from hand to hand in place of deposits. The Bank of St. George at Genoa and the Bank of Venice were the first corporations to use paper money. Their bills were bullion certificates. Because the use of these receipts was so much more convenient than carrying about heavy bags of gold and silver, they became popular with merchants and even circulated at a premium over coin.

Note: See "The Geography of Money," *National Geographic Magazine*, December, 1927.

Bulletin No. 2, October 17, 1932.

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BRICK TEA IS "MONEY" IN MONGOLIA

The book-sized object held in the hand of the Chinese caravan man is a block of the coarse, harsh tea indispensable to Mongols and Turkis. Russian "tea kings" who controlled caravan trade were men of wealth and power until a few years ago.

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The Saar, Bone of Contention Between France and Germany

KEEP an eye on the Saar. The end of the fifteen-year period for which the coal mines of the Saar basin were turned over to France approaches, and this tiny region is bidding for an important place in European politics.

A huge protest meeting of delegations from the Saar was held in Koblentz recently. League of Nations rule of the Saar was denounced and demands were made that it be returned to Germany.

Two-thirds the Size of Rhode Island

The Saar, which straddles the Lorraine-German border, almost next door to Luxembourg, is a region about two-thirds as large as Rhode Island and is famous for its mineral deposits. Before the World War, when Lorraine was German territory, the combination of Lorraine iron deposits and Saar coal deposits made this region one of the outstanding steel production regions of Europe.

Saar coal, perhaps, would still belong to Germany if it were not for the efficiency of German troops who, while retreating in north France, destroyed coal mines that once yielded 28,000,000 tons annually. Because of this act, when the Peace Treaty was framed, diplomats attempted to compensate France by turning over Saar coal-digging rights to France for a period of fifteen years—1920 to 1935. The German government also was called upon to pay private mine owners in the Saar fields for their losses, but these losses were not difficult to meet, as most of the mines were the state property of Prussia and Bavaria.

The transfer of coal mining rights to France, however, could not be made without a lot of political juggling. The region could not remain under German control, because the property rights of the French would not be assured protection, and the great German population and German property could not be placed under French control. The League of Nations, therefore, set up a governing commission composed of one Frenchman, one citizen of the local region, and three non-French and non-German members. The commission is directly responsible to the League Council.

Named for the Saar River

Saar took its name from the Saar River, a winding stream which flows through the western part of the region. While coal is the district's most famous product, the river banks are covered with vast fruit orchards and vineyards. There are also farms, but agriculture is not a major Saar industry. On the picturesque hills, here and there crowned by ancient ruins of Roman days, are thick forests which form the basis of another important industry.

The coal mines now being worked lie about ten miles to the northeast of Saarbrucken, a city of some 125,000 inhabitants who are employed in many industries. Saarbrucken's skyline is studded with the smokestacks of blast furnaces, metal-working establishments of many kinds, machine shops, chemical works and pottery kilns. The city is an important railroad center.

Saarbrucken went to France ten years before our Declaration of Independence was signed. After the Battle of Waterloo, the Allies took it and turned it over to Prussia. At that time the coal deposits were hardly known. Its present prestige may be credited to the development of the steel industry which thrust it to the front among the important European mineral regions owing to its location near the Lorraine iron deposits.

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and the only change was a slight twilighting and chilling of the bluish-green. 'Two hundred feet' was called down to us, and we stopped with a gentle jerk while another clamp was attached to the telephone cable, and soon we were sinking again.

"Ever since the beginnings of human history, when first the Phoenicians dared to sail the open sea, thousands upon thousands of human beings had reached the depth at which we were now suspended, and had passed on to lower levels. But all of these were dead, drowned victims of war, tempest, or other acts of God. We were the first living men to look out at the strange illumination.

"It was of an indefinable deep blue quite unlike anything I have ever seen in the upper world, and it excited our optic nerves in a most confusing manner. We kept thinking and calling it brilliant, and again and again I picked up a book to read the type, only to find that I could not tell the difference between the blank page and a colored plate.

"As we began our further descent I found that Barton and I had the same thought; we were waiting breathlessly for the sudden elimination of all light. It seemed from moment to moment that it would soon become absolutely dark, and the fact of the terrible slow change from dark blue to blacker blue was the most impressive thing about the descent. Then the thought came that this was not night because there had never been any day.

"'Eight hundred feet' came down the wire, and I called a halt. Half a dozen times in my life I have had hunches so vivid that I could not ignore them, and this was one of the times. Eight hundred feet spelled bottom, and I could not escape it.

"About an hour after we started we were on deck again, waiting for the tedious and deafening pounding and unscrewing of the many giant nuts which held us safely in. As the center bolt came loose we could hear the hissing escape of the compressed air which we were breathing. Yet we had had no ill effects and no sense of oppression."

Note: Students interested in deep-sea life will find additional data and natural color paintings of strange denizens of the deep in "The Depths of the Sea," *National Geographic Magazine*. January, 1932; and "A Round Trip to Davey Jones' Locker," June, 1931. See also: "The Islands of Bermuda," January, 1922. Dr. Beebe will describe further adventures under the sea in an early issue of the *National Geographic Magazine*.

Bulletin No. 3, October 17, 1932.

© *Photograph from William Beebe*

HEAD-FIRST IS THE PROPER WAY TO LEAVE THE BATHYSPHERE!

One must abandon all dignity to be a deep-sea explorer. Dr. Beebe is shown emerging from the cramped quarters of the bathysphere, a painful leap over rough bolts. During a dive this narrow opening is sealed with a circular, 400-pound steel door, securely bolted into place.

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Railway from Holy Land to Baghdad Is Proposed

A NEW railway, which will parallel age-old caravan routes across the desert from the Holy Land to Baghdad, is being considered in the Near East. The proposed line would follow the great oil pipe line now in course of construction between Baghdad and the Mediterranean ports of Haifa and Tripoli.

Pipe lines and railway projects are two more indications that the "Unchanging East" is in a state of rapid flux. Dr. Maynard Owen Williams, representative of the National Geographic Society with the Citroën-Haardt Trans-Asiatic Expedition, which crossed this region last year, reports desert sheiks in sun goggles, riding fast motor cars; desert water holes with radio, tennis courts, and airdromes; and Boy Scouts in the "Garden of Eden."

Machines, Western Clothes and Canned Foods

"From Syria to the heart of Mesopotamia (Iraq) we found costumes and customs changing with the passing of every day," Dr. Williams writes.

"The Near East lives intensely to-day. Certainly no area is undergoing such rapid and sweeping changes. The price of remaining unchanged for centuries is now being paid, not in slow installments, but in a lump sum. The influx of Western ideas of thought and action, through mechanical devices, occidental clothing, and even canned foods, all are conspicuous.

"Modern asphalt paving speeded the Expedition tractor cars over the first lap of the long trek across Asia. All along the new highway to Damascus demoniac Syrian bus and truck drivers whizzed around us, honking to the side of the road flocks of sheep and camel caravans. Airplanes droned overhead, carrying mail and dispatches to outposts of the French Foreign Legion in remote desert oases.

"Even beyond Damascus the open touring cars of the 'Overland Desert Mail, Baghdad-Beyrouth-Haifa' gave us their dust. Tadmur (Palmyra) was a miserable collection of Arab hovels among the columns and arches of ancient civilization when I saw it last. The ruins of classical Palmyra still sleep in the scorching desert sun, but near-by rises a triangular new city of concrete houses and palm-shaded hotels and mosques, a creation of the French.

Sheiks around the Council Table

"At the Hotel Zenobia in New Palmyra I was given an insight into the ways of the modern desert dwellers; sons of the white-robed sheiks who have dashed on horseback through so many pages of exciting fiction and romance. The hotel gathering was to arbitrate a feud that only ten years ago would have meant hordes of nomads in foment, thousands of camels herded hopelessly along, and reckless riders making forays toward the enemy camp.

"Outside the hotel stood their steeds, mostly American motor cars with their radiator caps plumed like Mandarins of a forgotten day. And while these men of the desert argued their case the hotel phonograph flippantly played 'I Kiss Your Hand, Madam.' Only the white flowing robes linked the picture with the past. The thin face of the Arab desert dweller is lighted with the eyes of hawk and falcon, but when the modern sheik sallies forth into his sandy domain his eyes may be hidden behind smoked glasses, and his saddle is likely to be the upholstered seat of a straight-eight.

"This picture, of course, is not universally true, but the fact that modern ideas

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Recent reports indicate that there is a growing movement in some parts of Europe to urge the creation of an independent Saar state, under the protection of the League of Nations.

If no change is made from the original provisions of the Treaty, however, in 1935 the people of the region will decide by popular vote whether to live under the French or the German flag.

Note: For additional reading and photographs of Germany see: "Renascent Germany," *National Geographic Magazine*, December, 1928. See also: "Battlefields of France Eleven Years After," November, 1929; "Rediscovering the Rhine," July, 1925; and "The Story of the Ruhr," May, 1922.

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BUCKETLIKE BOOTS KEEP HIS FEET DRY

While most German coal mines burrow deep into the earth, a few are open diggings such as this. Tin boots may be heavy, but they can be dried in a trice, and they will take much rough usage.

and devices have made inroads where for centuries change has been resisted is significant, and promises greater changes in the future.

"Even farther into the Syrian Desert the tiny hamlet of Rutba has blossomed forth into a busy community, with an airdrome, a wireless station, a good hotel, a fort and a post office. Giant planes of the London-Delhi, Amsterdam-Batavia and Marseilles-Saigon air lines here swoop to earth. Automobile or airplane passengers may spend the night under desert stars and play a few brisk sets of tennis the next morning before setting out again. The squat yellow fort is surrounded by barbed-wire entanglements and fences of rusty, empty oil and gasoline tins.

"At the outskirts of the Iraq town of Ramadi, on the Euphrates River, the dusty caravan trail ends in a welcome tarred road, leading to Baghdad. 'For Motors Only' reads a sign along the side of this road, although motors are newcomers to this desert route. A semi-weekly motor convoy, however, does a thriving business, many of the passengers being pilgrims to the Christian and Mohammedan holy places.

"Not far from the city of Baghdad two busses rolled up to the Expedition cars, and a score or more of native youngsters piled out. But these were not ragged Arab urchins, bawling for baksheesh. The New East was welcoming us by a troop of Iraki Boy Scouts, dressed very much like our own youths except that they wore small sun helmets, a style first popularized by King Feisal."

Note: See also "The Citroën-Haardt Trans-Asiatic Expedition Reaches Kashmir," *National Geographic Magazine*, October, 1931. The concluding chapter of this first motor crossing of Asia will appear in the November, 1932, issue of The Magazine. For a description of the Near East as it was before the invasion of modern ideas see: "Crusader Castles of the Near East," March, 1931; "Bethlehem and the Christmas Story," December, 1929; "The Pageant of Jerusalem," December, 1927; and "Skirting the Shores of Sunrise" and "In the Birthplace of Christianity," December, 1926.

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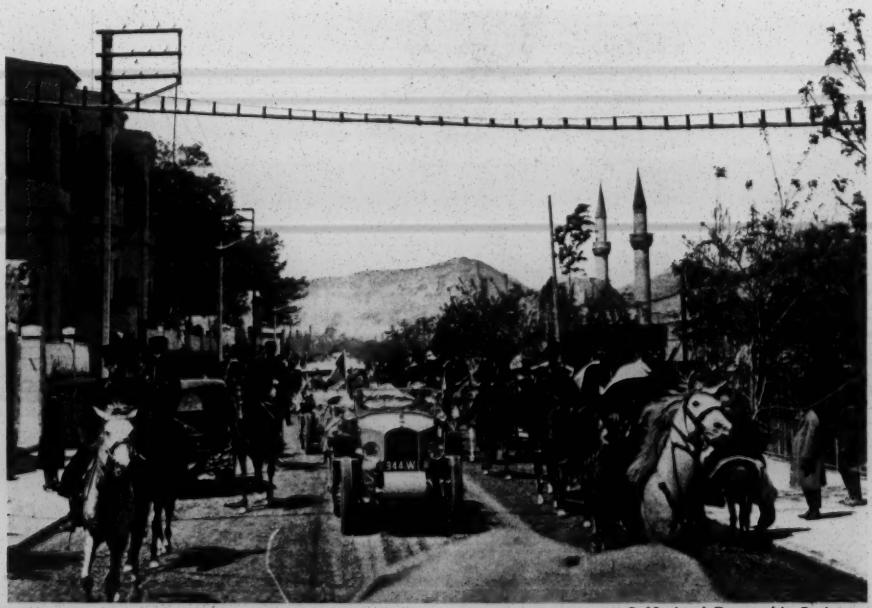

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TELEPHONE WIRES AND MOTOR CARS IN THE "WORLD'S OLDEST CITY"

Damascus, along with other ancient communities of the Near East, is changing rapidly. Good roads link it with the Mediterranean, and regular motor service is maintained to Baghdad, Palestine, and other places once reached only by plodding camel caravans. The photograph shows the tractor cars of the Citroën-Haardt Trans-Asiatic Expedition entering Damascus.